

PATENT SPECIFICATION

790,551



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COMPLETE SPECIFICATION.

An Improved Apparatus for Lubricating Wire Cables or Ropes.

I, DAVID GLADSTONE BALFOUR REEKIE, a British Subject, of "Netherby", Johnstone, Renfrewshire, Scotland, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention has reference to apparatus for lubricating wire cables or ropes, hereafter referred to as cables.

I am aware of Patent No. 612,180 wherein is set forth an apparatus for lubricating wire ropes of cables comprising a pump casing for connection to a lubricant reservoir, a rotor eccentric in said casing, said rotor having one or more lubricant ducts, and a bush or the like located within the rotor and rifled or threaded in accordance with the helical wires or strands of the rope to be lubricated, the arrangement and construction being such that when a rope is drawn through the bush the latter is rotated and rotates the rotor which functions to force lubricant through the duct or ducts to the rope.

One object of the invention is to provide an apparatus for lubricating cables which will automatically adjust itself to irregularities in the diameter of the cable due, for example, to a splice therein.

Another object of the invention is to provide an apparatus for lubricating cables by which lubricant can be applied to the cable under substantial pressure so that it will penetrate the cable.

According to the present invention an apparatus for lubricating cables comprises an outer enclosing casing connected or adapted to be connected to a source of lubricant supply, a rotary member therein having packing which forms the ends of a lubricant chamber to which the lubricant is

supplied under pressure and means to rotate the rotary member together with the packing comprising a driving member provided with a plurality of circumferentially disposed elongated teeth-like members each adapted to bear on one side only of a strand or wire of a cable passed through the rotary member and lubricant chamber, the construction being such that when a cable is drawn through the rotary member and lubricant chamber the co-operation of the cable with the teeth-like members rotates the rotary member and packing, the packing maintaining the ends of the chamber sealed sufficiently to ensure substantial pressure being maintained in said chamber.

The invention further consists in an apparatus as set forth in the preceding paragraph having in combination therewith a motor driven pump to supply lubricant under pressure to the lubricant chamber.

Each of such teeth-like members may be resiliently urged radially inwards and an adjustable stop provided to restrict its inwards movement so that it will be prevented from engaging other than the side of a strand or wire of the cable.

A further feature of the invention consists in the provision of a plurality of scrapers to remove extraneous matter from the cable prior to the cable entering the lubricant chamber, each scraper being mounted on a tooth-like member to move radially in unison therewith.

Both the outer casing and the rotary member may be formed of two sections and provided with interlocking means comprising a plunger provided in each section of the outer casing, and a manually operable member pivotally mounted on one of the sections of the outer casing, which member, when rotated, operates both plungers so that they will engage with and retain the two sections of the rotary member in position within the

sections of the outer casing when the outer casing is opened.

A preferred embodiment of the invention will now be described with reference to the accompanying drawings wherein:—

Figure 1 is an elevation, partly in section, of the improved apparatus;

Figure 2 is an end view thereof looking to the right;

Figure 3 is an end view thereof, partly in section, looking to the left;

Figure 4 is a sectional elevation thereof but omitting the rotor driving means;

Figure 5 is a section on the line 5—5 of Figure 4;

Figure 6 is a view looking to the left of Figure 1 with the end cover removed;

Figure 7 is a section on the line 7—7 of Figure 6 but with the end cover in position; and

Figure 8 is a section on the line 8—8 of Figure 6.

As shown in the drawings the improved apparatus includes a cylindrical rotary member or rotor with axial bore and formed of two half sections 11.

Substantially centrally of this rotor is a plurality of passages 12 extending from the exterior to the inner face thereof, such passages forming part of a lubricant chamber. The rotor is formed with an outwardly extending flange 13, which constitutes a thrust bearing and abutting against the flange is one end of an outer casing or stator 14, a flanged cover 15 being secured to the end of the stator and bearing on the other face of the flange. The stator is provided with an inner annular recess 16 which also forms part of the lubricant chamber and which is provided with an inlet port 17 to which lubricant is supplied under pressure by a motor driven pump. The stator 14 is formed of two half-sections having lugs 18 and 18a at one side thereof through which passes a hinge pin 19. At the other side one of the sections is provided with a pivotally mounted locking device 20 provided with a nose 21. Said device is provided with a cam groove 22 in which fits a pin 23 carried by a plunger 24 which makes a sliding fit in the section carrying the locking device and is arranged at its inner end to fit in a hole 25 formed in the section of the rotor housed in the said section of the stator.

Said nose is formed with an arcuate rack 26 with which meshes a pinion wheel 27 carried by the other section of the stator. This second section also carries a plunger 28 having a rack 28a meshing with the pinion wheel 27, the plunger at its inner end being adapted to fit in a hole 29 formed in that section of the rotor fitted in that section of the stator.

A spring loaded ball 30 is arranged to engage in one of two recesses 31 formed in

the plunger 28 whereby the plungers can be held in their outer or inner positions as the case may be. The locking device projects into a gap in the stator section carrying the pinion wheel and is provided with a screw threaded stud 32 on which is screwed a flanged nut 33 which will prevent accidental turning of the stud and locking device.

One end of the rotor carries the driving member 34 which will now be described. This member embodies a number, for example six, cable engaging devices 35. Each device is formed with an elongated tooth 35a so as to engage with one side only of a substantial length of a lay of rope 36. Each tooth is slightly hogged to conform to the contour of the cable.

The cable engaging devices are fitted within radial guides or slots formed in the body of the driving member 34 and are urged radially inwards by helical compression springs, 38. The compression of the springs can be independently adjusted by means of screws 39 threaded into internally tapped holes in an outer encircling case 40. To limit the inward movement of the driving devices each carries a tappet 41 arranged at its inner end to engage an inner fixed flange 42.

On the outer face of the driving member is a number, for example six, radial plates 43 anchored to the spring loaded driving devices 35, their inner ends being adapted to conform with the wires or strands of the cable, as shown in Figure 2, so that said plates will remove extraneous matter from the cable prior to the cable entering the apparatus to receive lubricant.

Said driving member is formed of two sections 34a and 34b which can be opened out together with the rotor to which they are attached by screws 44.

The rotor on each side of that part thereof which constitutes the lubricant chamber is provided with long annular recesses 45 in which are fitted rubber or like resilient liners 46. Bearing on each liner is a plurality of segmental packing rings 47 and on the outer ends of the two groups of packing rings are segmental metal rings 48 the segments thereof being interconnected by a pin and slot arrangement to permit of their expansion and contraction.

Pins 49 extend longitudinally through the packing and ring segments. That ring near the driving member abuts against an internal shoulder 50 formed on the stator and on the other outer ring bears a gland 57 which, by the usual stud and nut arrangement, can exert the requisite end pressure on the packing.

Sleeves 52 encircling the pins where they extend between the two sets of packing rings, i.e. where they extend through the lubricant chamber, serve to transmit the pressure of

the gland to the inner set of packing rings, said sleeves also holding the two sets of packing rings in spaced relationship. It will be understood that the gland and packing rings can be opened together with the stator and rotor to permit of the introduction of a cable. Swivelling bolts 53 carried by one section of the rotor and nuts 54 threaded thereon are provided to secure the rotor in the closed position.

To introduce a cable 36 into the lubricating apparatus the said locking device 20 is turned about its pivot and the nuts 54 on the eyebolts slackened off to permit said bolts to swing clear. One of the stator sections with the rotor section contained therein is then swung about its pivot pin 19, the said plungers 24 and 28 engaging the rotor sections to retain them in position. Then the sections are brought together with the cable clamped therein. The scrapers 43 are adjusted to bear on the wires or strands of the cable and the driving devices 35 adjusted so that they bear only on one side of the strands of the cables. The spring pressure may also be adjusted and likewise the end thrust of the gland.

When a cable is drawn through the device the scrapers 43 first remove extraneous matter therefrom and thereafter the driving devices 35 by co-operating with the strands impart a rotary movement to the rotor and thus to the packing. Lubricant is fed to the lubricant chamber under pressure by the pump and consequently it is forced into and lubricates the cable. By reason of the pressure at which the lubricant can be supplied the lubricant penetrates the cable.

Any irregularities of the cable does not affect the drive. The elongated teeth 35a and the scrapers can yield radially outwards. Further in the event of there being a part of increased diameter in the cable such part will impinge on segmental rings 48 which, through the longitudinal rods 49, force the segments of the packing radially outwards to permit of the passage of the cable there-through.

As the packing segments rotate with the rotor they will maintain a fairly effective oil tight seal at the two ends of the oil chamber.

In a modified construction of cable lubricating apparatus in accordance with the invention the lubricant is delivered to the lubricating chamber by means of an internal rotary pump, the rotor having spring loaded radial vanes which bear on the inner wall of the stator. The stator and rotor form a crescent shape chamber therebetween. The lubricant trapped by the vanes is forced through spring loaded non-return mushroom valves to the lubricant chamber.

What I claim is:—

1. An apparatus for lubricating cables comprising an outer enclosing casing connected or adapted to be connected to a source of lubricant supply, a rotary member therein having packing which forms the ends of a lubricant chamber to which the lubricant is supplied under pressure and means to rotate the rotary member together with the packing comprising a driving member provided with a plurality of circumferentially disposed elongated teeth-like members each adapted to bear on one side only of a strand or wire of a cable passed through the rotary member and lubricant chamber, the construction being such that when a cable is drawn through the rotary member and lubricant chamber the co-operation of the cable with the teeth-like members rotates the rotary member and packing, the packing maintaining the ends of the chamber sealed sufficiently to ensure substantial pressure being maintained in said chamber.

2. An apparatus as claimed in Claim 1 having in combination therewith a motor driven pump to supply lubricant under pressure to the lubricant chamber.

3. An apparatus as claimed in either of the preceding claims wherein each of such teeth-like members is resiliently urged radially inwards and an adjustable stop is provided to restrict its inwards movement so that it will be prevented from engaging other than the side of a strand or wire of the cable.

4. An apparatus as claimed in any of the preceding claims having a plurality of scrapers to remove extraneous matter from the cable prior to the cable entering the lubricant chamber, each scraper being mounted on a tooth-like member to move radially in unison therewith.

5. An apparatus as claimed in any of the preceding claims wherein both the outer casing and the rotary member are formed of two sections and are provided with interlocking means comprising a plunger provided in each section of the outer casing, and a manually operable member pivotally mounted on one of the sections of the outer casing, which member, when rotated, operates both plungers so that they will engage with and retain the two sections of the rotary member in position within the sections of the outer casing when the outer casing is opened.

6. An apparatus for lubricating wire cables or ropes, substantially as herein described and illustrated in the accompanying drawings.

MARKS & CLERK.

PROVISIONAL SPECIFICATION.

An Improved Apparatus for Lubricating Wire Cables or Ropes.

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This invention has reference to apparatus for lubricating wire cables or ropes, hereafter referred to as cables.

One object of the invention is to provide an apparatus for lubricating cables which will automatically adjust itself to irregularities in the diameter of the cable due for example to a splice therein.

Another object of the invention is to provide an apparatus for lubricating cables by which lubricant can be applied to the cable under substantial pressure so that it will penetrate the cable.

According to the present invention an apparatus for lubricating cables comprises an outer enclosing casing connected or adapted to be connected to a source of lubricant supply, a rotary member therein having packing which forms the end of a lubricant chamber to which the lubricant is supplied under pressure and means to rotate the rotary member together with the packing comprising a driving member provided with a plurality of circumferentially disposed elongated teeth-like members each adapted to bear on one side only of a strand or wire of a cable passed through the rotary member and lubricant chamber, the construction being such that when a cable is drawn through the rotary member and lubricant chamber the co-operation of the cable with the teeth-like members rotates the rotary member and packing so that the packing maintains the ends of the chamber sealed sufficiently to ensure substantial pressure being maintained in said chamber.

The invention further consists in an apparatus as set forth in the preceding paragraph having in combination therewith a motor pump to supply lubricant under pressure to the lubricant chamber.

Each of such teeth-like members may be resiliently urged radially inwards and an adjustable stop provided to restrict its inwards movement so that it will be prevented from engaging other than the side of a strand or wire of the cable.

A further feature of the invention consists in the provision of a plurality of scrapers to remove extraneous matter from the cable prior to the cable entering the lubricant chamber, each scraper being mounted on a tooth-like member to move radially in unison therewith.

A still further feature of the invention resides in providing each section forming the outer casing with a plunger, a manually operable locking member pivotally mounted on one section and adapted to engage the other section and which member when rotated to unlock the sections operates both plungers so that they will engage with and retain in position the two sections of the rotary member.

Preferably in carrying the invention into effect the improved apparatus includes a cylindrical rotory member or rotor with axial bore and formed of two half sections.

Substantially centrally of this rotor is a plurality of passages extending from the exterior to the inner face thereof, such passages forming part of a lubricant chamber. The rotor is formed with an outwardly extending flange, which constitutes a thrust bearing and abutting against the flange is one end of an outer casing or stator, a flanged cover being secured to the end of the stator and bearing on the other face of the flange. The stator is provided with an inner annular recess which also forms part of the lubricant chamber and which is provided with an inlet port to which lubricant is supplied under pressure by a motor driven pump. The stator is formed of two half-sections having lugs at one side thereof through which pass hinge pins. At the other side one of the sections is provided with a pivotally mounted locking device provided with a nose to engage with the other member. Said device is provided with a cam groove in which fits a pin carried by a plunger which makes a sliding fit in the section carrying the locking device and is arranged at its inner end to fit in a hole formed in the section of the rotor housed in the said section of the stator.

Said nose is formed with an arcuate rack with which meshes a pinion wheel carried by the other section of the stator. This second section also carries a plunger having a rack meshing with the pinion wheel, the plunger at its inner end being adapted to fit in a hole formed in that section of the rotor fitted in that section of the stator.

A spring loaded ball engages in one of two recesses formed in the last mentioned plunger whereby the plungers can be held in their outer or inner positions as the case may be. The locking device projects into a gap in the stator section carrying the pinion wheel and is provided with a screw threaded stud on which is screwed a flanged nut which will prevent accidental turning of the stud and locking device.

One end of the rotor carried the driving member which will now be described. This member embodies a number, for example six, cable engaging devices. Each device is in the form of an elongated tooth so as to engage with one side only of a substantial length of a lay of a rope. Each tooth is slightly hogged to conform to the contour of the cable.

The cable engaging devices are fitted within radial guides and are urged radially inwards by helical compression springs. The compression of the springs can be independently adjusted by means of screws threaded into internally tapped holes in an outer encircling case. To limit the inward movement of the driving devices each carries a tappet arranged at its inner end to engage an inner fixed flange.

On the outer face of the driving member is a number, for example six, radial plates anchored to the resilient driving devices or teeth, their inner ends being adapted to conform with the wires or strands of the cable so that said plates will remove extraneous matter from the cable prior to the cable entering the apparatus to receive lubricant. Said driving member is formed of two sections which can be opened out together with the rotor to which they are attached.

The rotor on each side of that part thereof which constitutes the lubricant chamber is provided with long annular recesses in which are fitted rubber or like resilient liners. Bearing on each liner is a plurality of segmental packing rings and on the outer ends of the two groups of packing rings are segmental metal rings the segments thereof being interconnected by a pin and slot arrangement to permit of their expansion and contraction.

Pins extend longitudinally through the packing and ring segments. That ring near the driving member abuts against an internal shoulder formed on the cylindrical member and on the other outer ring bears a gland which, by the usual stud and nut arrangement, can exert the requisite end pressure on the packing.

Sleeves encircling the pins where they extend between the two sets of packing rings, i.e. where they extend through the lubricant chamber, serve to transmit the pressure of the gland to the inner set of packing rings, said sleeves also holding the two sets of packing rings in spaced relationship. It will be understood that the gland and packing rings can be opened together with the stator and rotor to permit of the introduction of a cable. Eye bolts carried by one section of the rotor and nuts threaded thereon are provided to secure the cylindrical member in the closed position.

To introduce a cable into the lubricating apparatus the said locking device is turned about its pivot and the nuts on the eyebolts slackened off to permit said bolts to swing clear. One of the stator sections with the rotor section contained therein is then swung about its pivot pins, the said plungers engaging the rotor sections to retain them in position. Then the sections are brought together with the cable clamped therein. The scrapers are adjusted to bear on the wires or strands of the cable and the driving devices adjusted so that they bear only on one side of the wires or cables. The spring pressure may also be adjusted and likewise the end thrust of the gland.

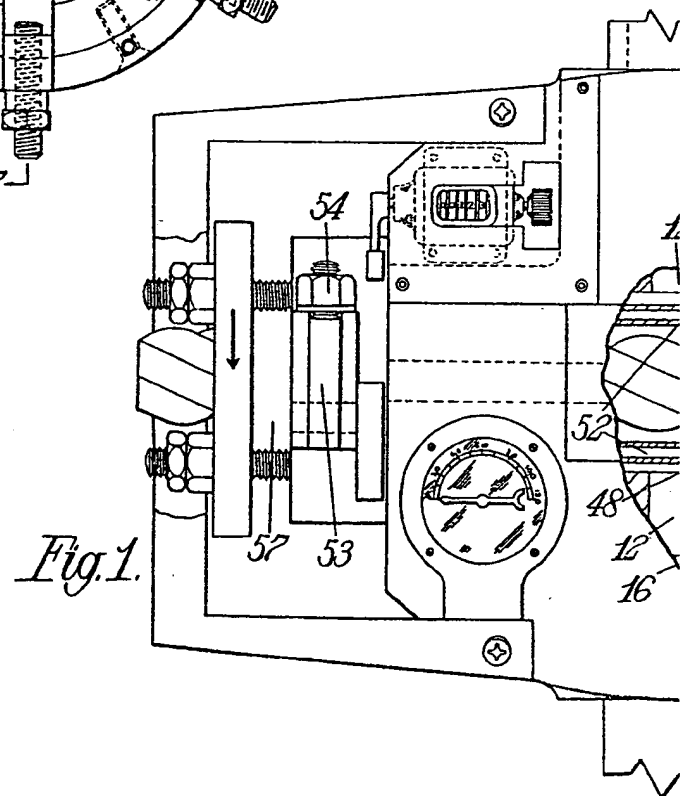
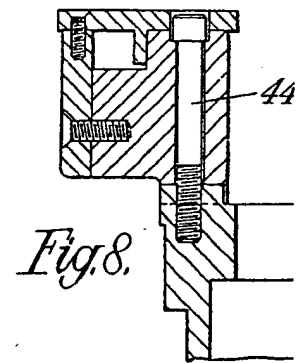
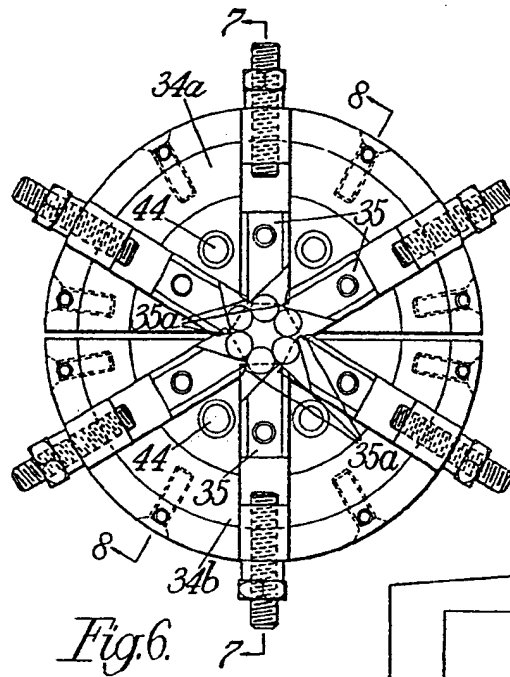
When a cable is drawn through the device the scrapers first remove extraneous matter therefrom and thereafter the driving devices by co-operating with the wires or strands impart a rotary movement to the rotor and thus to the packing. Lubricant is fed to the lubricant chamber under pressure by the pump and consequently it is forced into and lubricates the cable. By reason of the pressure at which the lubricant can be supplied the lubricant penetrates the cable.

Any irregularities of the cable does not affect the drive. Both the teeth-like devices and the scraper can yield radially outwards. Further in the event of there being a part of increased diameter in the cable such part will impinge on segmental rings which, through the longitudinal rods, force the segments of the packing radially outwards to permit of the passage of the cable therethrough.

As the packing segments rotate with the rotor they will maintain a fairly effective but not necessarily an oil tight seal at the two ends of the oil chamber.

In a modified construction of cable lubricating apparatus in accordance with the invention the lubricant is delivered to the lubricating chamber by means of an internal rotary pump, the rotor having spring loaded radial vanes which bear on the inner wall of the stator. The stator and rotor form a crescent shape chamber therebetween. The lubricant trapped by the vanes is forced through spring loaded non-return mushroom valves to the lubricant chamber.

MARKS & CLERK.

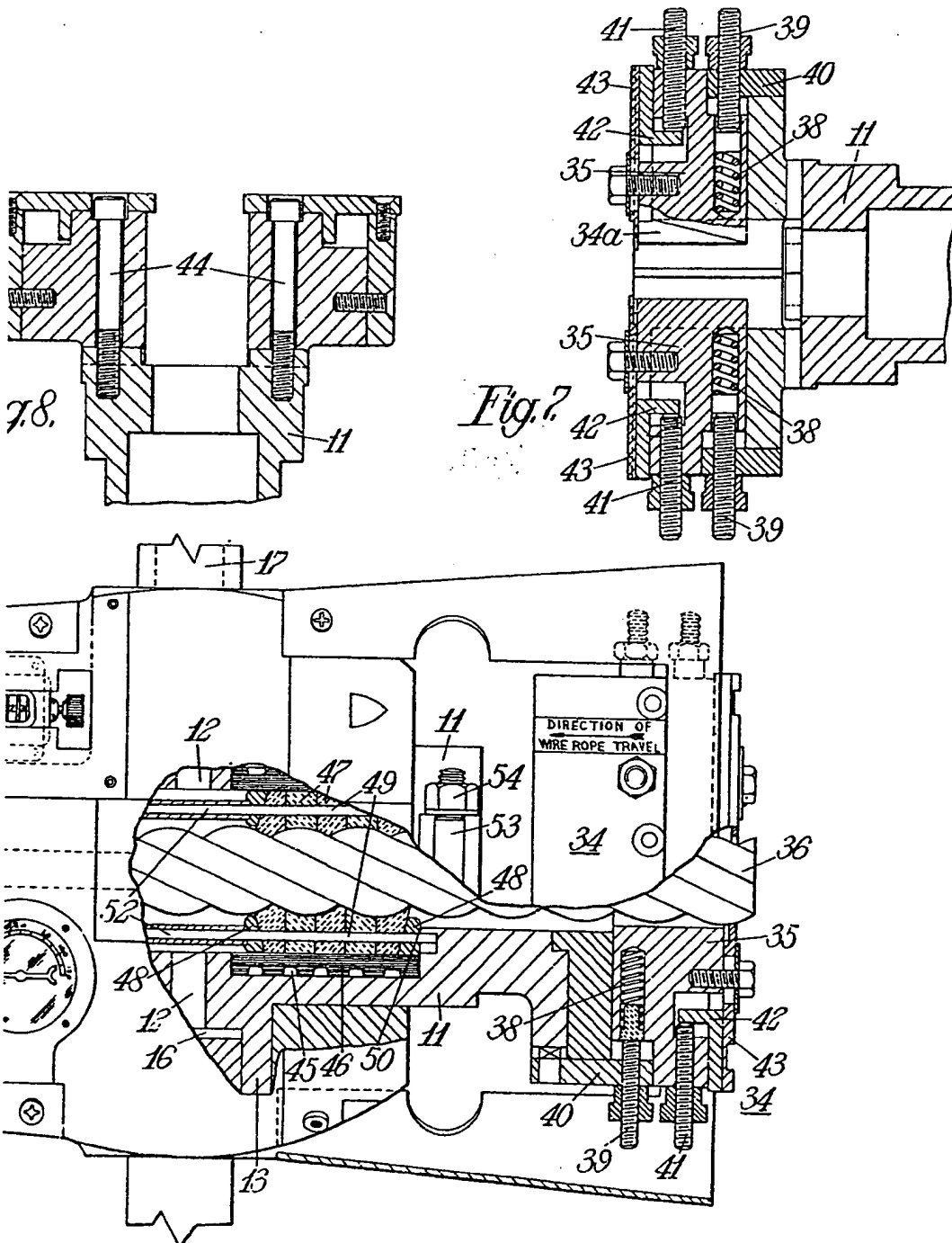


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2 SHEETS

This drawing is a reproduction of the Original on a reduced scale.

SHEET 1



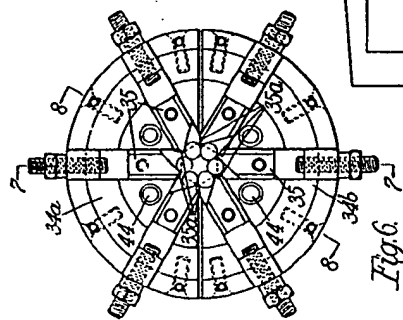


Fig. 6

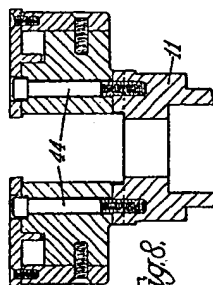


Fig. 8

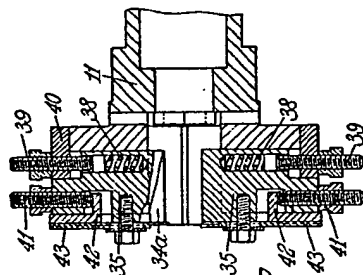


Fig. 7

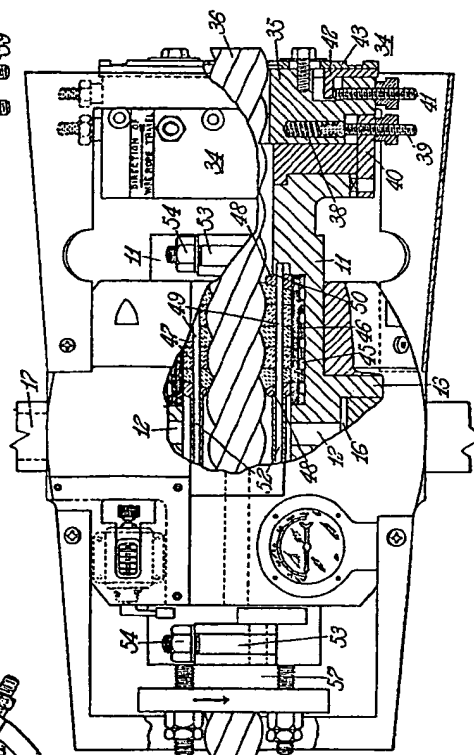
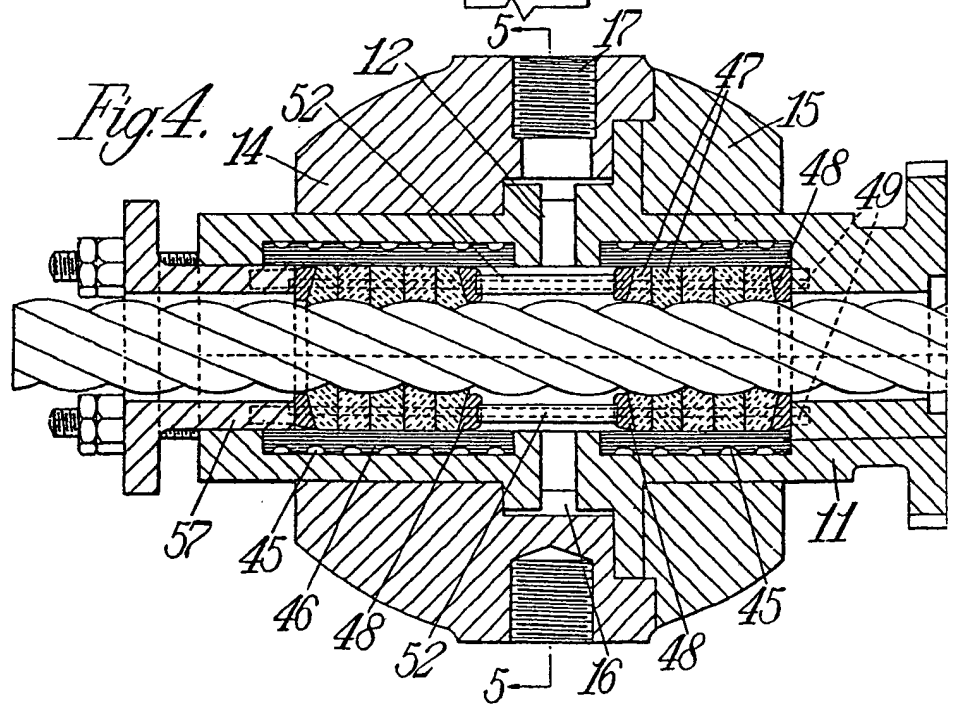
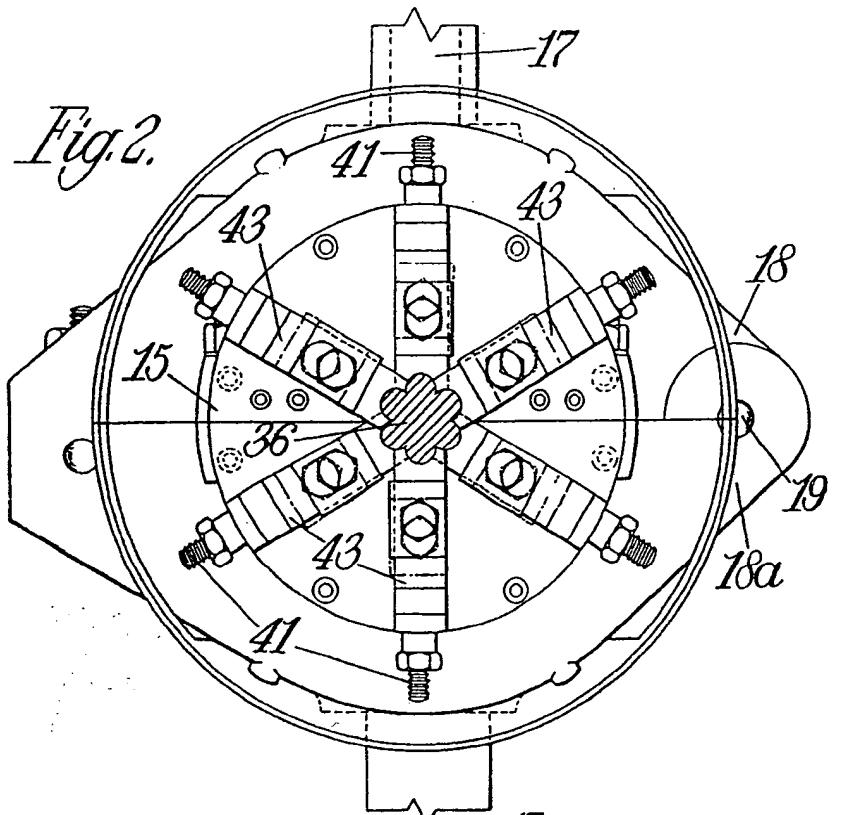
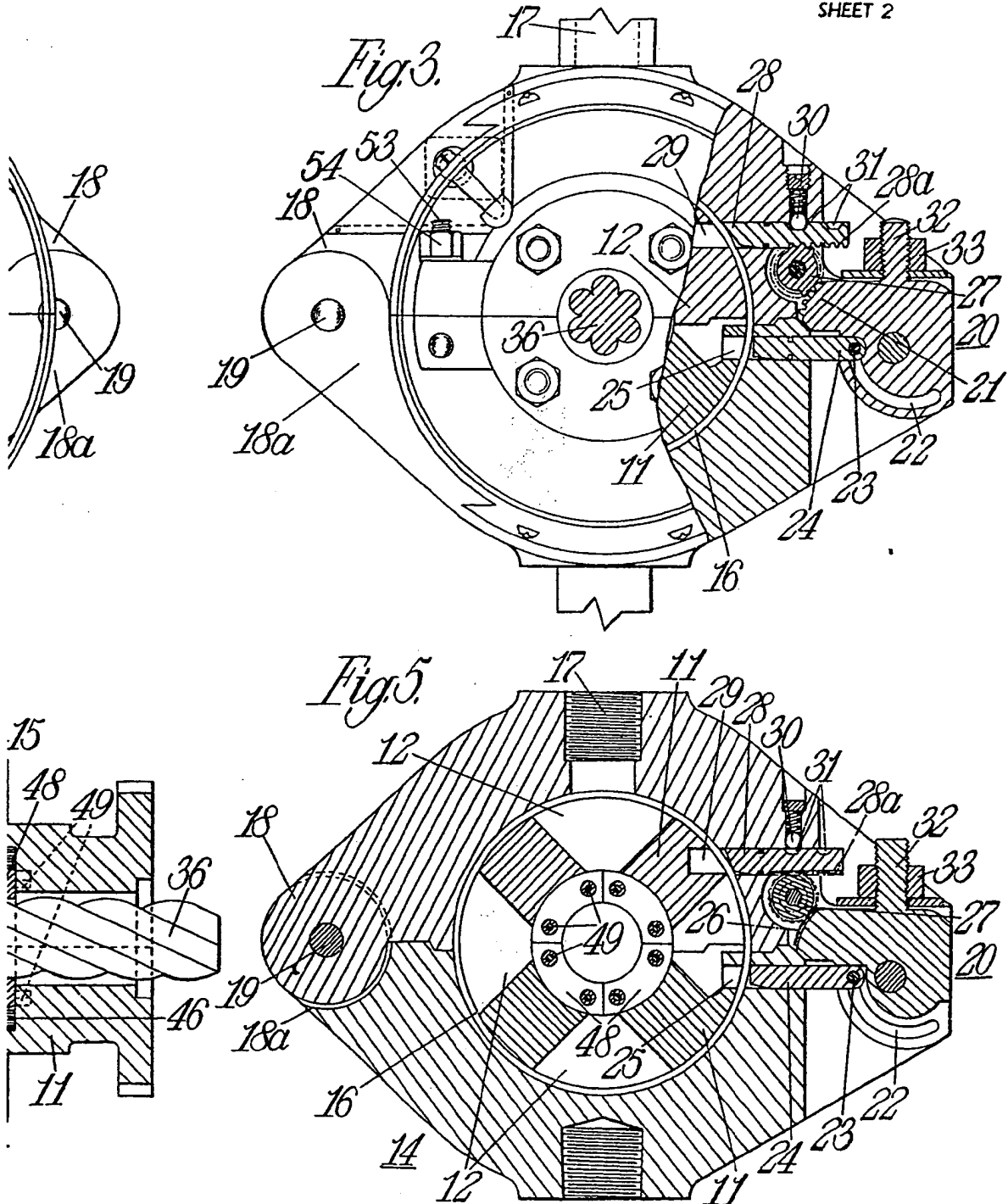
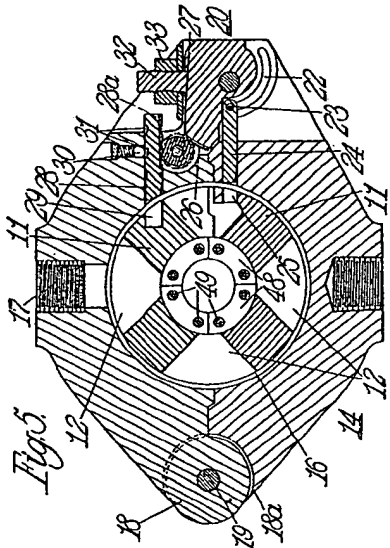
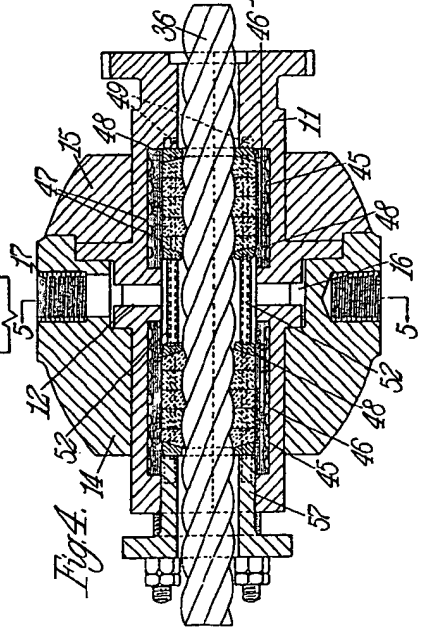
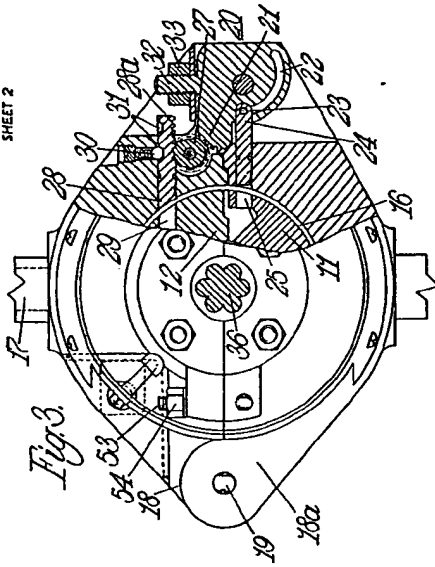
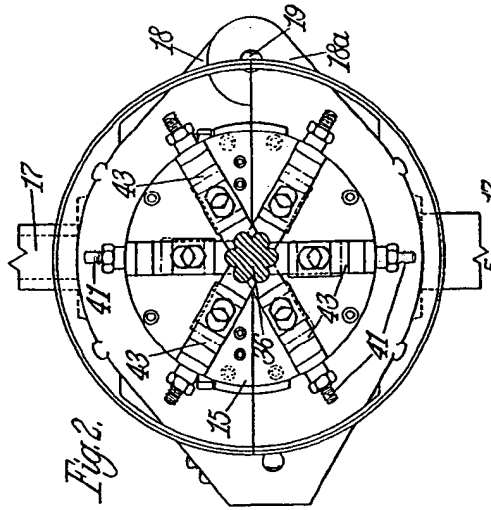


Fig. 1









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